

IAPMO TS 36-~~2023~~2024



**PUBLIC REVIEW DRAFT**

*Industry Standard for*

# **Prefabricated Quick Connect Fittings with Reinforced Hoses for Recreational- Vehicle Pressurized Water Systems**



# ***IAPMO Standard***

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# Preface

This is the ~~second~~ third edition of IAPMO TS 36, Prefabricated Quick Connect Fittings with Reinforced Hoses for Recreational-Vehicle Pressurized Water Systems. The previous edition of this standard is: July, 2022 and January 2023.

This Standard was developed by the IAPMO Standards Review Committee (SRC) in accordance with the policies and procedures regulating IAPMO industry standards development, Policy S-001, Standards Development Process. This Standard was approved as an IAPMO Industry Standard on **November 7, 2022**.

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  - (b) *relevant section, table, or figure number, as applicable;*
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IAPMO TS 36-~~2023~~2024

# Prefabricated Quick Connect Fittings with Reinforced Hoses for Recreational-Vehicle Pressurized Water Systems

## 1 Scope

### 1.1 Scope

This Standard covers quick connect fittings for use with flexible reinforced hoses compliant with IAPMO TS 25 intended for use in pressurized hot- and cold-water systems in recreational vehicles and specifies requirements for materials, physical characteristics, performance testing, and markings.

#### 1.1.2 Quick connect fittings covered by this standard may include but are not limited to the following:

- (a) Valves;
- (b) Couplings;
- (c) Adaptors;
- (d) Plugs;
- (e) Manifolds;
- (f) Backflow preventers;
- (g) Kitchen, sink, and lavatory supply fittings;
- (h) Bath and shower supply fittings; and
- (i) Pressure regulators.

### 1.2 Alternative Materials

The requirements of this Standard are not intended to prevent the use of alternative materials or methods of construction provided such alternatives meet the intent and requirements of this Standard.

### 1.3 Terminology

In this Standard,

“shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy to comply with the Standard;

“should” is used to express a recommendation, but not a requirement;

“may” is used to express an option or something permissible within the scope of the Standard; and

“can” is used to express a possibility or a capability.

Notes accompanying sections of the Standard do not specify requirements or alternative requirements; their purpose is to separate explanatory or informative material from the text. Notes to tables and figures are considered part of the table or figure and can be written as requirements.

## 1.4 Units of Measurement

SI units are the primary units of record in global commerce. In this Standard, the inch/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application, but each unit system is to be used independently. All references to gallons are to U.S. gallons.

## 2 Reference Publications

This Standard refers to the following publications, and where such reference is made, it shall be to the current edition of those publications, including all amendments published thereto.

**ASME International (The American Society of Mechanical Engineers)/ CSA Group (Canadian Standards Association)**

ASME A112.4.14/CSA B125.14

Manually operated valves for use in plumbing systems

ASME A112.18.1/CSA B125.1

Plumbing supply fittings

**IAPMO (International Association of Plumbing and Mechanical Officials)**

IAPMO TS 8

Backflow Preventers and Relief Valves

IAPMO TS 25

Reinforced Hoses for Recreational-Vehicle Pressurized Water Systems

**NSF**

NSF/ANSI 61

Drinking Water System Components - Health Effects

## 3 Definitions

The following definition shall apply in this Standard:

**Reinforced hose** — a non-rigid tube without end connections used for supplying or distributing water.



## 4 General Requirements

### 4.1 Water Supply Fittings

Prefabricated water supply fittings shall comply with the applicable requirements of ASME A112.18.1/CSA B125.1.

### 4.2 End Connections

End connections of quick connect fittings intended for coupling with new or existing systems shall comply with the requirements in Figure 1.

### 4.3 Stainless Steel

Stainless steel components in contact with water shall be made of 300 or 400 series stainless steel alloys.

### 4.4 Transition Fittings

Transition fittings intended for coupling between exiting systems shall comply with the applicable standard.

### 4.5 Toxicity

Materials and components of quick connect fittings for use with reinforced hoses intended to convey or dispense water for human consumption through drinking or cooking shall comply with the applicable requirements of NSF/ANSI 61.

### 4.6 Working Pressures

Quick connect fittings for use with reinforced hoses shall be designed to function at

- (a) Water supply pressures between 140 and 1030 ~~kPa~~ (20 and 150 psi);
- (b) Air supply pressures between 140 and 550 ~~kPa~~ (20 and 80 psi); and
- (c) Intermittent impulse pressures not exceeding ~~1,240~~896 ~~kPa~~ (~~180~~130 psi).

### 4.7 Working Temperatures

#### 4.7.1 Quick connect fittings for use with reinforced hoses intended for hot- and cold-water applications shall be

- (a) designed to operate at temperatures between 4 and 71 °C (40 and 160°F); and
- (b) capable of withstanding water at 82 °C (180°F) for 30 min~~utes~~ without failure of the pressure envelope.

#### 4.7.2 Quick connect fittings for use with reinforced hoses intended for cold-water applications only, shall be capable of withstanding water at 49 °C (120°F) for 30 min~~utes~~ without failure of the pressure envelope.

### 4.8 Workmanship

#### 4.8.1 Outer surfaces shall be weather-resistant and free from defects and imperfections.

#### 4.8.2 Internal surfaces of quick connect fittings shall be of smooth-bore construction.

#### 4.9 Backflow Preventers and Relief Valves

Backflow preventers and relief valves with quick connect fittings shall comply with IAPMO TS 8.

#### 4.10 Directional and On/Off Valves

Directional and on/off valves shall comply with ASME A112.4.14/CSA B125.14, or ASME A112.18.1/CSA B125.1.

### 5 Testing Requirements

#### 5.1 Hydrostatic Pressure Test

##### 5.1.1 Test Specimen

Three test specimens for the hydrostatic pressure test shall be configured as follows:

- (a) A hose shall be attached to each connection point of the fitting end.
- (b) The hose connections to the fitting ends shall be prefabricated if supplied by the manufacturer or assembled in accordance with the manufacturer's installation instructions.
- (c) Each hose shall be at least 900 mm (36 in) in length.

##### 5.1.2 Test Specimen Conditioning

###### 5.1.2.1 In Water

When the test medium is water, quick connect fittings with hoses intended

- (a) for hot- and cold-water applications shall be submerged in water at  $82 \pm 3$  °C ( $180 \pm 5$ °F) for 30 minutes; and
- (b) only for cold-water applications shall be submerged in water at  $49 \pm 3$  °C ( $120 \pm 5$ °F) for 30 minutes.

###### 5.1.2.2 In Air

When the test medium is air, quick connect fittings with hoses intended

- (a) for hot- and cold-water applications shall be conditioned for 60 min at ambient laboratory conditions while flowing water at  $82 \pm 3$  °C ( $180 \pm 5$ °F); and
- (b) only for cold-water applications shall be conditioned for 60 min at ambient laboratory conditions while flowing water at  $49 \pm 3$  °C ( $120 \pm 5$ °F).

##### 5.1.3 Test Procedure

The hydrostatic pressure test shall be conducted as follows:

- (a) Install the test specimens in accordance with the manufacturer's instructions.
- (b) Fill the test specimens with water at  $82 \pm 3$  °C ( $180 \pm 5$ °F) for hot- and cold-water applications, or at  $49 \pm 3$  °C ( $120 \pm 5$ °F) for cold-water only applications.
- (c) Apply a pressure of ~~1100~~ 896  $\pm 35$  kPa (~~160~~ 130  $\pm 5$  psi) or two times the manufacturer's rated working pressure, whichever is greater, to the test specimens.
- (d) Maintain the test pressure and temperature for 30 minutes.
- (e) If the test specimens were submerged, remove them from the water.
- (f) Inspect the test specimens for cracks or leaks while still pressurized.

**5.1.4 Performance Requirement**

The quick connect fittings and hose connections shall not leak, crack, or otherwise fail.

**5.2 Intermittent Impulse Pressure Test****5.2.1 Testing Water Temperatures**

Test specimens intended

- (a) for hot- and cold-water applications shall be tested using water at  $82 \pm 3$  °C ( $180 \pm 5$ °F); and
- (b) only for cold-water applications shall be tested using water at  $49 \pm 3$  °C ( $120 \pm 5$ °F).

**5.2.2 Test Procedure**

The intermittent impulse pressure test shall be conducted as follows:

- (a) Install the test specimen in accordance with the manufacturer's instructions.  
*Note: The hose connections to the fitting ends may be prefabricated if supplied by the manufacturer.*
- (b) Supply water to the test specimen at  $7.6 \pm 1.9$  L/min ( $2.0 \pm 0.5$  gpm) ensuring that the upstream flowing pressure does not exceed 517 kPa (75 psi).
- (c) Stop the flow and increase the pressure to  $1,240 \pm 35$  kPa ( $180 \pm 5$  psi) [from 517 kPa (75 psi)]. Steps (b) and (c) shall be one cycle.
- (d) Cycle the test specimen 100,000 times at a minimum of 7 cycles/min as follows:
- (e)  $3 \pm 1$  s at 517 kPa (75 psi) maximum; and
- (f)  $3 \pm 1$  s at  $1,240 \pm 35$  kPa ( $180 \pm 5$  psi).

**5.2.3 Performance Requirement**

The test specimen shall not leak, crack, or otherwise fail.

**5.3 Pullout Test****5.3.1 Test Specimen**

The test specimens for the pullout test shall be configured with a hose attached to a connection point of the fitting end. Each hose shall be at least 900 mm (36 in) in length.

**5.3.2 Cycle Test**

The test procedure for the cycle test shall be conducted on each fitting end connection type as follows:

- (a) Secure the hose in position;
- (b) Apply a minimum tensile force of 67 N (15 lbf) to the end connection;
- (c) Release the applied force until the tensile force is 0 N (0 lbf) or the system reaches a natural state;
- (d) Cycle the applied force between 0 N (0 lbf) and 67 N (15 lb) 10,000 times;
- (e) Gradually apply a minimum tensile force of 334 N (75 lbf).

**5.3.3 Wrap Around Test**

The wrap around test shall be conducted as follows:

- (a) After completing the cycle test in Section 5.1.3.2, wrap the specimen around a 50 mm (2 in) mandrel;
- (b) Apply a minimum force of 67 N (15 lb) at the end connection until the hose makes complete contact with the mandrel.

### 5.3.4 Performance Requirement

The quick connect fittings and hose connections shall not leak, crack, or otherwise fail when subject to the hydrostatic pressure test in Section 5.1 of this standard.

## 5.4 Vibration Test

### 5.4.1 Test Procedure

The vibration test shall be conducted as follows:

- (a) Assemble the test specimen by joining three couplings, and two elbows with six lengths of reinforced hose as illustrated in Figure 2.
- (b) Mount the test specimen on a rigid horizontal board/frame;
- (c) Strap the assembly to the board/frame to allow the vibrations to transfer to the entire test assembly and at the support points shown in Figure 2;
- (d) Strap the assembly to the board/frame with enough tolerance for the specimen to vibrate within the allowed 3.2 mm (0.13 in) amplitude;
- (e) Fill the test specimen with water at  $20 \pm 3$  °C ( $68 \pm 5$ °F).
- (f) Pressurize the test specimen to ~~1379~~896  $\pm 35$  kPa (~~200~~130  $\pm 5$  psi).
- (g) Subject the test specimen to 1,000,000 vibration cycles. A vibration cycle shall be a forward and reverse movement of 1.6 mm (0.065 in) [3.2 mm (0.13 in) total amplitude at a frequency of  $25 \pm 2$  Hz.
- (h) At the completion of 1,000,000 cycles, increase the test specimen pressure to  $2,068 \pm 35$  kPa ( $300 \pm 5$  psi).
- (i) Maintain the pressure in step (f) for 48 h.

### 5.4.2 Performance Requirement

There shall be no leakage.

## 5.5 Ultra-Low Temperature, Freeze/Thaw Test (Optional)

### 5.5.1 Test Specimen

The test specimens for the optional ultra-low temperature, freeze/thaw test shall be configured as follows:

- (a) A hose shall be attached to each connection point of the fitting end.
- (b) The hose connections to the fitting ends shall be prefabricated if supplied by the manufacturer or assembled in accordance with the manufacturer's installation instructions.
- (c) Each hose shall be at least 900 mm (36 in) in length.

### 5.5.2 Test Procedure

The optional ultra-low temperature, freeze/thaw test shall be conducted as follows:

- (a) Fill the test specimen with room temperature water and cap the ends;
- (b) Place in a freezer box and decrease the temperature in the box to  $-34 \pm 3$  °C ( $-30 \pm 5$ °F);
- (c) Let stand for 24 hours;
- (d) Remove from freezer box;
- (e) Allow the specimen to thaw under ambient laboratory conditions to room temperature;

**5.5.3 Performance Requirement**

The quick connect fittings and hose connections shall not leak, crack, or otherwise fail when subject to the hydrostatic pressure test in Section 5.1 of this standard.

**6 Markings****6.1 Requirements**

**6.1.1** Quick connect fittings for use with reinforced hoses complying with this Standard shall be marked with the

- (a) manufacturer's name or trademark;
- (b) nominal outside diameter;
- (c) maximum rated working pressure at 23 °C (73°F); and
- (d) maximum rated working pressure at 82 °C (180°F), when applicable.

**6.1.2** In addition the markings in Section 6.1.1, quick connect fittings intended only for cold-water applications shall bear the legend "Only for use with cold water".\*

*\*The equivalent French wording is "Pour utilisation avec eau froide seulement".*

**6.2 Characteristics**

Markings shall be

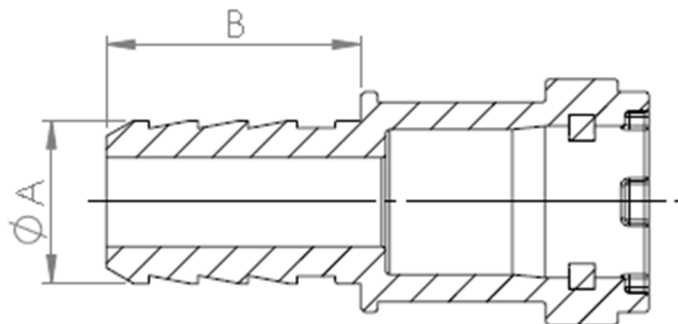
- (a) permanent or indelibly marked on the fitting or on the hose in cases where prefabricated fittings with hoses are supplied by the manufacturer;
- (b) in legible letters and numerals at least 3 mm high;
- (c) of a color that contrasts with the fitting; and
- (d) repeated at intervals of not more than 300 mm (12 in).

**Figure 1**  
**End Connections Dimensional Requirements**  
(See Section 4.1)

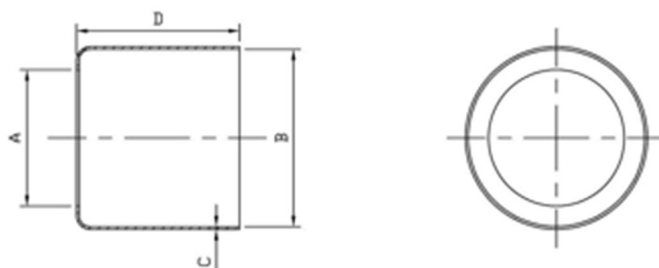


HOSE	A: ID (mm)	B: OD (mm)	C: Thickness (mm)
1/2"	11.9 ±0.1	16.9 ±0.1	2.5 ±0.1
3/4"	19 ±0.2	25 ±0.2	3 ±0.2

Hose	Thickness	A : ID (mm)	B : OD (mm)	C : Thickness (mm)
1/2"	2.5 mm	11.9+/- 0.1	16.9 +/- 0.1	2.5 +/- 0.1
1/2"	3.0 mm	12.0+/- 0.1	17.9 +/- 0.1	3.0 +/- 0.1
3/4"	3.0 mm	19.0 +/- 0.2	25.0 +/- 0.2	3.0 +/- 0.2



INSERT	A (mm)	B (mm)
1/2"	12.2 ±0.1	22.9 ±0.1
3/4"	19.2 ±0.1	30 ±0.1

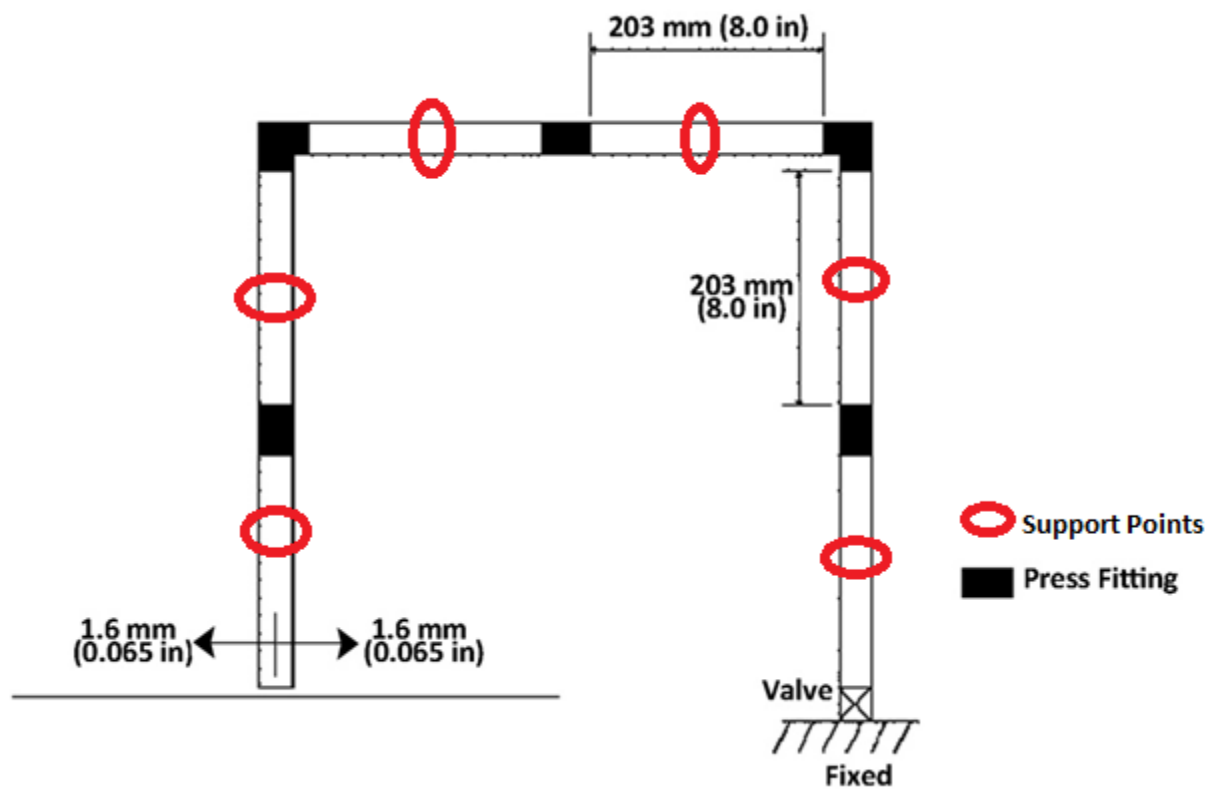


Crimp	A (mm)	B (mm)	C (mm)
<del>1/2"</del>	<del>12.4 ±0.1</del>	<del>16.9 ±0.1</del>	<del>0.4 ±0.02</del>
<del>3/4"</del>	<del>20 ±0.2</del>	<del>26 ±0.2</del>	<del>0.4 ±0.04</del>

<del>Crimp</del>	<del>A (mm)</del>	<del>B (mm)</del>	<del>C (mm)</del>
<del>1/2"</del>	<del>12.7 +0.2</del>	<del>17.1 +1.2</del>	<del>0.47 +0.02</del>
<del>3/4"</del>	<del>20 +0.2</del>	<del>26 +0.2</del>	<del>0.4 +0.04</del>

<u>Crimp</u>	<u>Thickness</u>	<u>A (mm)</u>	<u>B (mm)</u>	<u>C (mm)</u>
<u>1/2"</u>	<u>2.5 mm</u>	<u>12.7+/- 0.2</u>	<u>17.1 +/- 1.2</u>	<u>0.47 +/- 0.02</u>
<u>1/2"</u>	<u>3.0 mm</u>	<u>12.6+/- 0.2</u>	<u>18.1 +/- 1.2</u>	<u>0.47 +/- 0.02</u>
<u>3/4"</u>	<u>3.0 mm</u>	<u>20.0 +/- 0.2</u>	<u>26.0 +/- 0.2</u>	<u>0.47 +/- 0.04</u>

**Figure 2**  
**Vibration Test Set Up**  
(See Section 5.4)







## **International Association of Plumbing and Mechanical Officials (IAPMO)**

**4755 East Philadelphia Street | Ontario, California, 91761**

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